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PRACTICAL QUESTIONS, ANSWERS AND SUGGESTIONS.

1. What is the best medium for imbedding leaves and plant stems in the well of the microtome?

A. L. Woodward,
Syracuse.

I have not had the *best success* by the use of any "medium" which I have attempted, nor in the use of a microtome with a well.

I use soft cork or the pith of cornstalk or elder, or any other material that will yield to the pressure of the stem or leaf; shaping the material as nearly as may be to the form of the stem or leaf to be cut.

Vegetable stems or leaves should be cut immediately after they are broken from the plant. To imbed them, they must be more or less dried out. In drying they shrink; shrinking compresses the stem, which of course distorts its internal structure, and the sections will not show the true structure.

Rivet's pattern of microtome is the most convenient I have seen for cutting such material.

Wm. Humphrey,
Adrian, Mich.

2. Is there any definite rule for adjustment of cover-correction of objectives?

There is no *one* rule which can be *easily* made to work with all objects.

Correcting by coma is the one which is most generally to be relied upon. With diatoms the apparent position of the marking serves as a good guide. Correction color is frequently made when the object is transparent and well marked.

A. Y. Moore,
Cleveland, O.

3. How can one best provide for preserving the life of a species while studying its life history?

That depends certainly upon the object. Some objects keep well in the animalcule slide of Prof. Weber. Others need a continuous supply of fresh water. For large objects Holman's Siphon-Slide is good. There are many "Life" slides which are good, but a difficulty is generally found in keeping *any* object alive any length of time.

A. Y. Moore,
Cleveland, O.

4. What objectives will constitute the best working series for practical use with ½-inch, 1-inch and 2-inch eye-pieces?

My own experience would lead me to prefer a 1-inch, ½-inch and ⅙-inch. The aperture in each case to be the greatest consistent with *the best* chromatic and spherical corrections.

If four objectives be allowed I should recommend a 1-inch, $\frac{1}{2}$-inch, $\frac{1}{4}$-inch or $\frac{1}{8}$-inch of 100° to 150° (air) and $\frac{1}{10}$. The last to be homogeneous immersion and wide angle.

A. Y. MOORE,
Cleveland, O.

5. Where shall we commence to measure to obtain what is called the standard length of a microscope tube?

I am unable to state with certainty, at present, but think from an investigation of objectives which I am now making that it differs in different objectives according to formula of construction, etc.

A. Y. MOORE,
Cleveland, O.

6. What is the best microtome for cutting vegetable sections, such as woods, barks, roots, etc.?

I do not undertake to say which is the best. For wood I use a carpenter's vice and a very finely set carpenter's smoothing-plane. Then select from the shavings for sections. Same for barks and hard roots.

WM. HUMPHREY,
Adrian, Mich.

Boil the wood until soft, and then fasten in microtome well and cut with a sharp chisel.

B. F. QUIMBY,
Chicago, Ill.

7. What is the best method of sharpening the knife for cutting vegetable section?

A. L. WOODWARD.

I use a fine hone, finishing on a razor strop, holding the knife close to hone so that the back touches. The knife needs sharpening oftener while used for vegetable sections than when cutting animal tissues, because of the presence in vegetables of a great abundance of crystals.

WM. HUMPHREY,
Adrian, Mich.

9. What is the best cement for sealing preparations that are to be used with homogeneous immersion objectives?

I use nothing but the white zinc cement furnished by Mr. Walmsley of Philadelphia.

J. EDWARDS SMITH, M. D.,
Cleveland, O.

Depends entirely upon the fluid to be used. If oil, such as cedar oil—*shellac* is good. If the glycerine fluids, almost *any* cement answers well. A thin solution of gelatin is good with oils, for alcohol or chloroform can be used to clean off with.

A. Y. MOORE,
Cleveland, O.

10. What is the best method of adjusting an adjustable objective to produce the most satisfactory image? Has the plan of Zeiss (the plan is at least stated by him) any objectionable features? As I understand his plan, it is to mark various thicknesses of covers on his adjustable objectives, then the thickness of a cover being known, the best adjustment is obtained simply by turning the adjusting collar till its index is opposite the number indicating or corresponding to the thickness of the given cover-glass.

There is no royal road to the adjustment of objectives; the art can only be acquired by patient practice. The above-named method of Zeiss—as also the plan proposed by A. Ross—in fact, any mechanical method, all are faulty and unsatisfactory in practice. *Example given:* Suppose we have in hand a balsam diatom slide, having $\frac{1}{300}$-inch cover; then those diatoms in contact with the under side of cover will require a different adjustment of objective from those in contact with the top surface of *slide*. Furthermore, owing to *varying* conditions of the eye, an expert manipulator working this slide *at different dates* would fail to use the same adjustment of the objective.

J. EDWARDS SMITH, M. D.,
Cleveland, O.

11. What is the best medium for breaking down Barbadoes earth before boiling? G.

A saturated solution of citric acid which acts on the iron more promptly than the mineral acids.

F. S. NEWCOMER, M. D.,
Indianapolis, Ind.

12. What is the best size for holding diatoms in arranged slides?

Febiger's size as follows: Acetic acid, 12 drachms; photographer's gelatin, 2 drachms; alcohol, 1 drachm.

Use a porcelain dish; add acid to gelatin, and stir in a water bath until dissolved; then add the alcohol and filter. Spread on slide with fine needle.

F. S. NEWCOMER, M. D.,
Indianapolis, Ind.

13. What is the best bleacher for diatoms to be used when boiling?

Deflagrate with potassium nitrate (saltpetre) in small quantities at a time. Sulphate of potassium and pure diatoms will be left. The sulphate can easily be washed away with water.

F. S. NEWCOMER, M. D.,
Indianapolis, Ind.

14. What is the best method of eliminating flocculent matter from diatoms after boiling?

For large forms boil in pure soap; let diatoms settle and pour off soap and water. For small forms I prefer aqua ammonia. F. S. NEWCOMER,
Indianapolis, Ind.

15. What is the best bristle for picking diatoms.

I prefer a cat's whisker. X.

16. What diatomaceous material is most easily cleaned, and where found?

Of fossil earths perhaps Cherry Hill, Me., or electro-silicon, a polishing powder found at the stores. Prof. H. C. Smith's method of boiling in soap and water is all that is needed. X.

17. How make colored varnishes for finishing purposes?

Good finishing varnishes are made by adding dry colors to dammar varnish or balsam, grinding and filtering. Allan Y. Moore makes a beautiful black of asphalt and of Japan gold-size. E. H. GRIFFITH,
Fairport, N. Y.

18. What will make a dead black background for slides?

Use the finest and the best ivory-drop-black, such as is used by carriage painters. Mix with turpentine. X.

19. Is an instrument practicable of moderate *weight* which shall carry *all* really valuable accessories (supra and substage), so adapted as to be always ready for immediate use, expenses not regarded? P. L. HATCH,
Minneapolis, Minn.

Yes. E. H. GRIFFITH, Fairport, N. Y.

20. What are some of the most interesting microscopic crystals?

The chemical crystals I have found most interesting, and many of which I have prepared, viz: Salicin, santonin, helicin, asparagin, aspartic acid, bichromate of potash, arsenious acid, cinchonoidine, hippuric acid, oxalate of ammonia, quinidin, sulphate of cadmium, sulphate of copper, chloride of copper, platinocynide of magnesium, pyrogallic acid.